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Effect Of Diet And Sleep On Academics Of Undergraduate Students

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Abstract: Background: With increasing competition, college students undergo heavy pressure to perform well academically which translates into poorer sleep and diet to save time for studying. Objectives: This study was conducted to investigate any relationship between sleep, diet and academic performance. Methodology: This work is a cross-sectional questionnaire-based study on topics of sleep, diet and academic performance measured by the latest semester grade point averages (GPA). Participants of this study consisted of 50 first-year management undergraduate students. Descriptive statistics and multivariate regression were used to analyze the data. Conclusions: Findings confirm how there's a prevalence in students to get higher GPAs with better sleep and diet.

Index Terms - Academic Performance. Diet, Sleep, University Students.

I. INTRODUCTION

As humans, we are complex systems. The way we treat our bodies (the input) affects our mood, productivity, mental health (the outputs). This is where the term 'biohacking' comes in. This concept of 'Do It Yourself Biology' has been around since 1988 with traction being via an intrigued Silicon Valley during 2005-2010.

Dave Asprey, also known as the father of modern biohacking defined it as "the art and science of changing the environment around you and inside you so that you have full control over your biology." Control being the keyword. Some techniques geared towards the same goals like Vipassana meditation and intermittent fasting have been a crucial component of several ancient cultures. Both of those are part of the daily routines of industry titans for example Twitter CEO Jack Dorsey.

As said by Dave Asprey, sleep and diet habits are aimed at ensuring peak human performance both mentally and physically. These two things form the very foundations of using health sciences to our advantage and using it to perform optimally.

We know that sleep is necessary to:

1. maintain critical body functions
2. restore energy
3. repair muscle tissue
4. allow the brain to process new information

Beyond anecdotal evidence from school students, actual research conducted by the University of Georgia found out that one in four students who reported sleep deprivation i.e. getting less than 7 hours of sleep daily impacted their grades negatively and in some cases to such an extent that it even resulted in cases of withdrawing from a course entirely. Scientific Reports journal found similar results with sleep deprived students performing poorly in class compared to others.

The more sleep students get, the more efficiently their brain retains the daily deluge of information imbibed on a daily basis, thus better reciprocating the same during exams and even faster understanding and interpretation of concepts.

Health choices and their correlation to academic success have been studied from the 90s. The link between diet, sleep and academic achievement, however, has gotten much less research focus in the population group of students. This is crucial area for research, evident with the large number of studies that exist demonstrating how unhealthy an average university student's diet actually is. [1][7]

Recent studies for age groups, such as children and teenagers, have already demonstrated that dietary intake does influence academic achievement [1][4]. Most of these studies focus on breakfast consumption, with evidence correlating that more frequent consumption of better nutritional breakfast is positively associated with academic achievement [1]. A 2017 review in school students (5–18 years) studied a broader range of dietary components and behaviors to compare with academic achievement and found that regular breakfast consumption alongside higher consumption of fruit, vegetables, certain micronutrients like folate, iron and lower consumption of junk foods, all collectively associated strongly with a higher academic performance based on the established metric of the study [4].

They also show the associations of how more frequent and regular eating sessions provide a vehicle for the delivery of these nutrients, as well as adequate energy to fuel cognitive function which usually translate into more focus and concentration during study sessions [12]. Several health behaviors, in particular, being physically active and attaining adequate sleep, are known to improve cognitive functioning and thus academic achievement [5]. Most of these studies are based out of Northern America and Central Europe.

The only study contradicting the positives of good sleep and diet on academics was on studying sleep quality and academic performance done on a small sample size found no significant correlations emerged between sleep quality or sleep propensity and academic performance [10].

Overall, existing studies on this topic tend to be lacking in their consideration of these and other potential confounding factors especially exploring the same in university and college students focused in Asian countries like India.

II. REVIEW OF LITERATURE

It has been observed that among university students, poor sleep quality is very prevalent. Studies over the years and show this to be seriously affecting their academic performance due to hampered daytime functioning. Various studies have concluded that sleep quality and quantity are among the most important factors affecting the academic performance of the students.

A 2006 study on sleep loss, learning capacity and academic performance found that not only sleep quality but also sleep quantity are closely related to student learning capacity and academic performance [5]. Similarly, another study on 'The Link Between Sleep Quantity and Academic Performance for the College Students' showed the presence of a significant and direct positive correlation between the amount of sleep per night and GPA [10].

Not only the sleep duration but also the concept of Wake-Up times is crucial to assess the sleep quality of a person. Wake-Up time refers to the number of times a person wakes up during his sleep. A report on the same titled "Health-related variables and academic performance among first-year college students: Implications for sleep and other behaviors" concluded that Wake-Up times and unhealthy sleep was directly associated with lower grades on an average [19]. According to another study on Sleep Duration and Academic Performance of student pharmacists showed that those students who slept longer on nights prior to exam had a much higher semester GPAs. [20]

A person can obtain all the benefits from sleep only when they sleep with a calm mind and feel peace and comfort i.e. with good sleep quality. Hertmann Et. Al. in their 2018 study found that sleep disturbances were an excellent sign of either current or future academic problems for students [9]. Also, another study on effects of sleep quality on the academic performance of undergraduate medical students analyzed that lower sleep quality lowers the academic performance [15]. A study involving undergraduates who completed an online survey to examine sleep habits and internalizing symptoms concluded that better sleep quality is related to less internalizing symptoms and in result a much better GPA [16].

Another important thing to note is that there are various factors which affect the sleep schedule, thereby affecting the academic performance indirectly. A cross-sectional study on alcohol consumption, sleep, and academic performance among college students, concluded that alcohol has a severely critical impact on sleep schedules of all consumers which translates into lower quality of daily sleep and lower GPAs, across the board [17].

Nutrition is important for brain development. It's been studied that when children are provided with a healthy diet that comprehensively also incorporates different kinds of food, there is an overall increase in academic performance. An Indian study concluded that the nutritional inputs of a college student had a strong relation with their academic performance [8].

Breakfast is considered the most important meal of the day for a student and is considered since it has a significant impact on health and brain development. This in turn from a very early age has a direct influence on the academic performance.

A study on the effects of breakfast on behavior and academic performance in young people aged 4-18yrs old, concluded that increased frequency of habitual breakfast was consistently positively associated with improved school performance [1].

A study found that eating breakfast, in contrast to fasting, may improve performance in the morning due to higher perceived cognitive functioning [18]. A similar finding can be noted by another study that explored breakfast eating habits of college students were over eleven-years. This study found a higher passing rate in students who never missed their breakfast before an exam.[14]

The overall eating habits and the composition of meals also have a crucial impact on the academics of the students. A medical research study of biochemical components that affected academic achievement analyzed the eating habits of college women and found reliable correlation between higher achievement, and good eating habits.[3]

A 2013 study to substantiate if healthier students were better learners and found that positive correlation was established between better diet habits and better grades focused mainly by reduced deficiency diseases, better eyesight, cardiovascular disorders like asthma and ADHD and similar conditions. Leafy green vegetables are packed with vitamins, minerals and fiber. These nutrients being greatly consumed in form of vegetables were associated with higher test scores. Students who eat junk food and consume a high level of alcohol are often associated with low academic performance. [4][6]

III. RESEARCH OBJECTIVES

1. To find a correlation between both sleep and diet on academic performance in a sample of Indian first-year undergraduate students.
2. To assess the importance of various factors under the topics of diet and sleep, having a significant impact or relation with the academic marks of students.

IV. RESEARCH METHODOLOGY

The overall study aimed at establishing a connection whether both healthy dietary and sleeping patterns of the students have a positive impact on their academic success.

Data Collection-

Data used for the analysis was collected through a self-administered questionnaire which was distributed to first-year undergraduate university students. A pilot test of the questionnaire was administered to the students. Feedback collected from the pilot group was assessed and adjustments were incorporated into a revised version of the questionnaire. Students who participated in the pilot test were not excluded from the main study, as participants in the pilot were anonymous, as were those in the main study.

For the main study, the questionnaire was circulated among the first-year undergraduate students pursuing the course of Bachelor of Business Administration (BBA) from Symbiosis Center for Management Studies, Pune. Responses were collected from 60 students and after data cleaning, the responses of 50 students were finalized for further study. The sample only consisted of first-year undergraduate students, because first-year student performance is anecdotally assumed to be a critical indicator of future student academic success. The subjects were selected at random without any kind of bias or classification. The final questionnaire assessed dietary intake and food consumption patterns, sleeping habits during both normal days and exam days, as well as the importance of a healthy diet. The sleep hours of the students were noted and the Sem-1 marks of the students were collected.

The method of the survey through a questionnaire was selected as it was the most feasible way of obtaining data from the university students.

Assessment of Nutrition and Importance of Healthy Diet- Students responded to the statement 'Healthy Diet is ___ to me' on a 4-point rating scale from very important to not important at all. Students were asked about the composition of their meals and if they skip any meal during both normal days and exam days. Students were asked if lunch made them feel dizzy in the classes or not. Students answered which meal was the most frequently skipped meal of the day during exams.

Assessment of Sleeping habits and Academic Marks- Sleeping hours during both normal days and exam days were collected. Students were asked how many hours of sleep they require to perform efficiently the next day. Students responded to the statement, 'I ___ that more hours of sleep help me perform better in the exams' on a 5-point rating scale from Strongly Agree to Strongly Disagree. The Sem-1 GPA was collected from the students and they were asked how satisfied they were with the marks.

Statistical Analysis-

Descriptive Statistics was used to generate certain relationships among the various variables related to diet and sleep. Use of descriptive statistics was chosen as it helps in sensibly simplifying large amounts of data. Use of graphs made it easy to present the findings in a meaningful way. Different variables were selected at a time to see the relation among them and generate conclusive findings. Descriptive statistics served the purpose efficiently.

Multiple Regression Analysis was used to generate efficient results which were suitable to meet the aim of the study. Regression analysis was performed to identify how much the predictor variables individually explained the variation in academic success across students. Out of the major three variables- Diet, Sleep and GPA, Diet and Sleep were taken as independent variables and GPA was taken as the dependent variable.

V. DATA ANALYSIS

Students were asked to state the number of hours they usually sleep and the number of hours of sleep they would require to perform efficiently. While studying the responses it was found that 24% of the students who completed the survey sleep less than the time, they need to perform efficiently the next day. The most common reason supporting this finding is the sleep schedule of the college students, wherein they go to bed late at night and have to wake up early morning to attend their classes the next day.

When we consider the number of hours the students sleep on the night before an exam, the results change drastically. 62% of the students sleep less than the number of hours of sleep they require to perform efficiently. The reasons for the same vary from incomplete preparation to pre-exam paranoia.

None of the reviewed literature appears to address the association between all-nighter study sessions and GPA. However, the absence of sleep is known to affect learning and result in a very noticeable performance decline. The same can be seen from the following graph. On the completion of the survey it was seen that 56% of the students agreed to the statement that more hours of sleep help to perform better in exams.

I _____ that more hours of sleep help me perform better in the exams

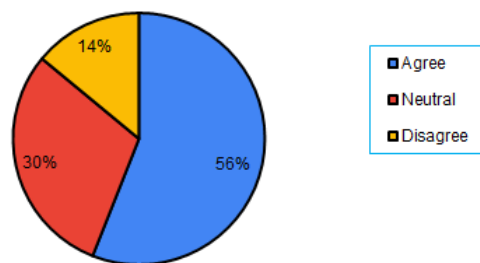


fig. 5.1: distribution of perceived performance improvement with more hours of sleep

Among the questions regarding the diet, students were asked if they feel that having breakfast on exam mornings helps them perform better and whether they have their breakfast before going for an exam. It was found that 34% of the students agree with the statement that having breakfast on exam mornings improves their performance, yet they skip their breakfast on exam mornings. The most common reasons for the same include that students may not be hungry or they stay busy preparing for the exams.

From the responses it was studied that 86% of the students are aware about the benefits of a healthy diet and consider it to be important for them. This shows that the various studies and researches stating the benefits of healthy diets on a human body have created sufficient awareness among the college students. However, there are still a few, who don't consider healthy diet to be important for them.

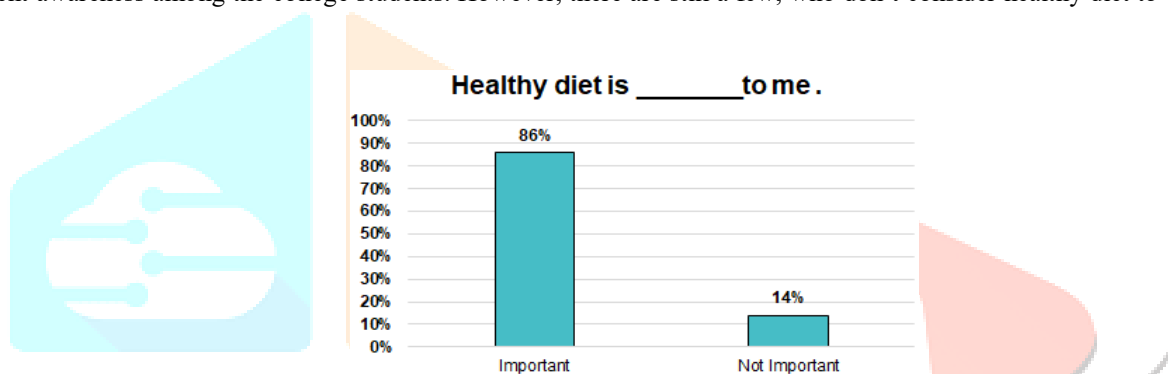


fig. 5.2: distribution of perceived importance of a healthy diet.

When students were asked about their most skipped meal of the day during exams, it was seen that breakfast and evening snacks are the most skipped meals. Among the students who skipped meals during the exams, 46.42% and 35.71% of students skip breakfast and evening snacks respectively. The proportion of lunch and dinner for the same was quite low.

Most skipped meal during exam

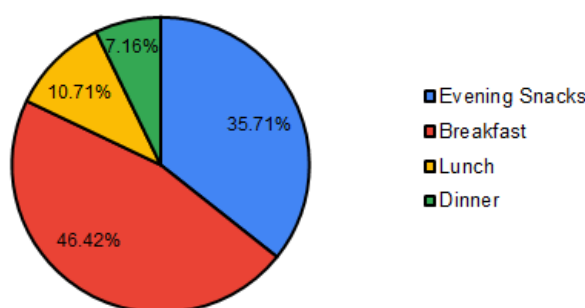


fig. 5.3: distribution of most skipped meals during exam

While doing regression analysis on selected variables, data yielded an R square of 0.1710 which means that our data can account for only ~17% of the movement of GPA, based on sleep and diet data. Consistent with this, p-values for all independent variables were greater than 5% meaning that they were statistically insignificant. We suspect this is due to random sampling error in lieu of high variability in a small sample i.e. just 50 students in a batch of 350+ students from a university with students internationally diverse. And also, the fact that sleep and diet influence grades only a very small amount since there are various other factors which were not the subject of this study.

Table 5.1
Regression data table

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	5.9471	1.0244	5.8057	0.0000
I skip breakfast Days	-0.1187	0.0615	-1.9298	0.0599
I _____ skip my lunch.	-0.0067	0.1021	-0.0657	0.9479
I _____ skip my dinner.	-0.0318	0.0965	-0.3293	0.7435
I actually sleep for _____ hours every night.	0.2958	0.1537	1.9244	0.0606

Table 5.2
Regression statistics table

<i>Regression Statistics</i>	<i>Data</i>
Multiple R	0.4135
R Square	0.1710
Adjusted R Square	0.0973
Standard Error	1.0117
Observations	50.0000

Table 5.3
Correlation table

<i>Correlation</i>	<i>I skip breakfast Days</i>	<i>I skip my lunch.</i>	<i>I skip my dinner.</i>	<i>I actually sleep for hours every night.</i>
I skip breakfast Days	1			
I _____ skip my lunch.	-0.0444	1		
I _____ skip my dinner.	0.3170	0.1137	1	
I actually sleep for _____ hours every night.	-0.0717	-0.1908	0.0349	1

As can be seen, correlation isn't too high between any of the variables, all less than 31%. Which proves that the insignificant p-values are not due to the high correlation between the independent variables.

Coefficient of skipping breakfast comes out to -0.119 suggesting that with each day increase of having a complete breakfast, GPA can be predicted to move positively by ~12%.

Coefficient of no. of hours slept every day on average comes out to 0.296 suggesting that with each hour increase in sleep, GPA can be predicted to move positively by ~30%.

Lunch and dinner having extremely high p-values of ~95% and ~74% respectively suggest they barely had any effect on movement, evident by their extremely low coefficients of ~ -0.006 and ~ -0.031 respectively.

Thus, with p-values of ~6%, we can conclude with 94% accuracy that getting more hours of sleep and proper diet especially not missing breakfast has a positive correlation with better academic performance.

VI. CONCLUSION

This paper aimed to study the relationship between both sleep and diet on the academics of college students. In theory, it is commonly believed that a great night's sleep and good eating habits lead to an improvement in the academic performance of students.

Diet universally impacts human health very much. So much so that all languages have a common saying that talks about humans being only as good as the food they eat. Among all the meals, breakfast can be termed as most important when it comes to studying the effect of diet on academic performance. The word breakfast stands very literally since it is the first meal that breaks the overnight fasting period. It jumpstarts our metabolism and alertness, while also providing essential nutrients required for daily functioning. It can be seen from the study that despite being considered the most crucial meal of the diet, breakfast however also appears to be the most skipped meal of the day as well. This shows that college students avoid breakfast regularly and ignore the need and importance of a healthy breakfast. However, this doesn't mean that the other components of a healthy diet are not important. It can be seen from the study that Lunch and Dinner having extremely high p-values are statistically insignificant and can barely predict the variation in the marks of the students.

Sleep is a crucial and yet, often neglected, component of every person's overall health and well-being. Many researchers over the years have studied the consequences of inadequate sleep or poor sleep quality and every year more and more studies confirm the importance of sleep and diet. Studies have also proposed that sleep deprivation causes depression, agitation, apathy, and poor academic performance in students.

The findings of the study show that a high proportion of students are used to sleeping less than the amount of sleep they need to perform efficiently. College students tend to pull all-night study sessions neglecting the need for adequate sleep before an exam. The statistical analysis from the study indicates that amount of sleep is an important predictor and can explain about 94% of variations in the academic marks of the students.

Limitations and Scope for Further Research:

Lunch and dinner yielded very high p-values suggesting that our sample was indifferent towards the same concerning GPA. This is suspected to occur due to random sampling error in a very small sample with high variability. Further intervention can be done in this subject as apart from sleep and diet, there are many more variables that affect the variations in the academic performance of the students. Some of the most common variables are physical exercise, concentration level, intelligence, etc. Also, while considering the variables sleep and diet, further analysis can be done concerning the composition of the diet, the sleep quality, and variations in sleep patterns of the college students.

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